National Institute of Environmental Health Sciences

Children's thermoregulation during exercise in the heat: A revisit

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Abstract:

The review revisits some child-adult differences relevant to thermoregulation and offers alternatives to accepted interpretations. Morphologically, children have a higher body surface area to mass ratio -- a major factor in "dry" heat dissipation and effective sweat evaporation. Locomotion-wise, children are less economical than adults, producing more heat per unit body mass. Additionally, children need to divert a greater proportion of their cardiac output to the skin under heat stress. Thus, a larger proportion of their cardiac output is shunted away from the body's core and working muscles -- particularly in hot conditions. Finally, under all environmental conditions and allometric comparisons, children's sweating rates are lower than those of adults. The differences appear to suggest thermoregulatory inferiority, but no epidemiological data show higher heat-injury rates in children, even during heat waves. We suggest that children employ a different thermoregulatory strategy. In extreme temperatures, they may indeed be more vulnerable, but under most ambient conditions they are not necessarily inferior to adults. Children rely more on dry heat dissipation by their larger relative skin surface area than on evaporative heat loss. This also enables them to evaporate sweat more efficiently with the added bonus of conserving water better than adults.

Source: http://dx.doi.org/10.1139/h07-185

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Injury, Other Health Impact

Other Health Impact: heat related morbidity

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified